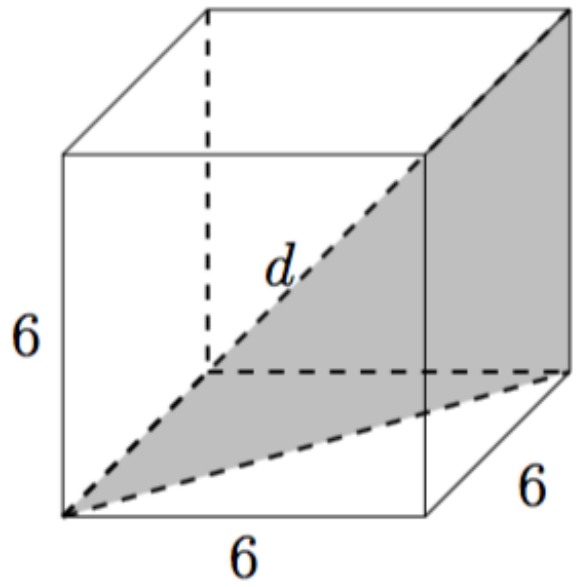
Topic: Diagonal of a right rectangular prism

Question: What is the length of the diagonal of the given cube?



Answer choices:

A 36

B $6\sqrt{2}$

C 108

D $6\sqrt{3}$

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Solution: D

Plugging the dimensions we've been given into the formula for the diagonal, we get

$$d = \sqrt{l^2 + w^2 + h^2}$$

$$d = \sqrt{6^2 + 6^2 + 6^2}$$

$$d = \sqrt{108}$$

$$d = 6\sqrt{3}$$

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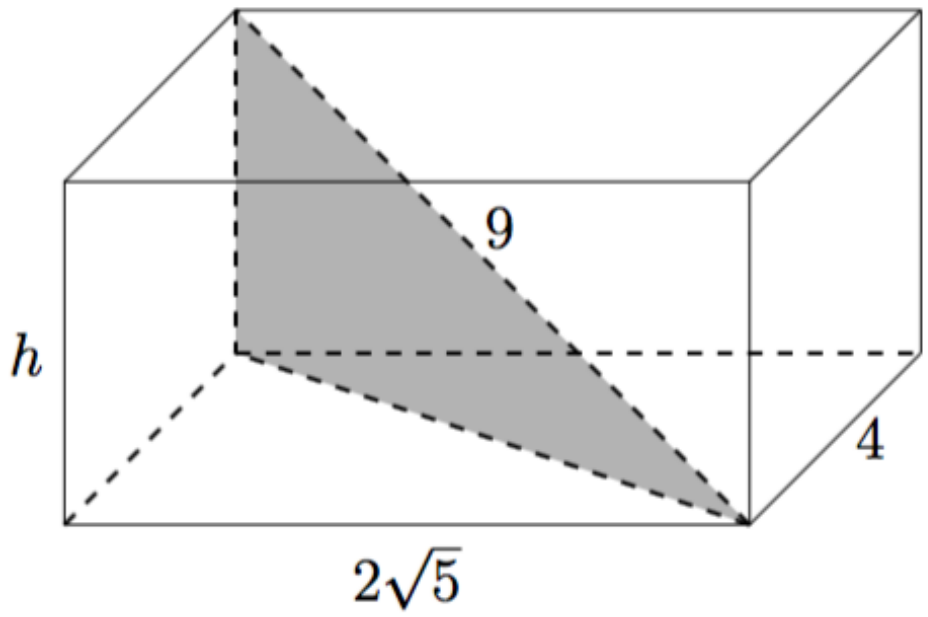
Topic: Diagonal of a right rectangular prism

Question: What is the height of the given right rectangular prism?



Answer choices:

A $5\sqrt{2}$

B $3\sqrt{5}$

C $2\sqrt{6}$

D $6\sqrt{2}$

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Solution: B

Plugging the dimensions we've been given into the formula for the diagonal, we get

$$d = \sqrt{l^2 + w^2 + h^2}$$

$$9 = \sqrt{\left(2\sqrt{5}\right)^2 + 4^2 + h^2}$$

$$9 = \sqrt{20 + 16 + h^2}$$

$$9 = \sqrt{36 + h^2}$$

Square both sides.

$$81 = 36 + h^2$$

$$h^2 = 45$$

$$h = \pm 3\sqrt{5}$$

Ruling out the negative value for h leaves us with

$$h = 3\sqrt{5}$$

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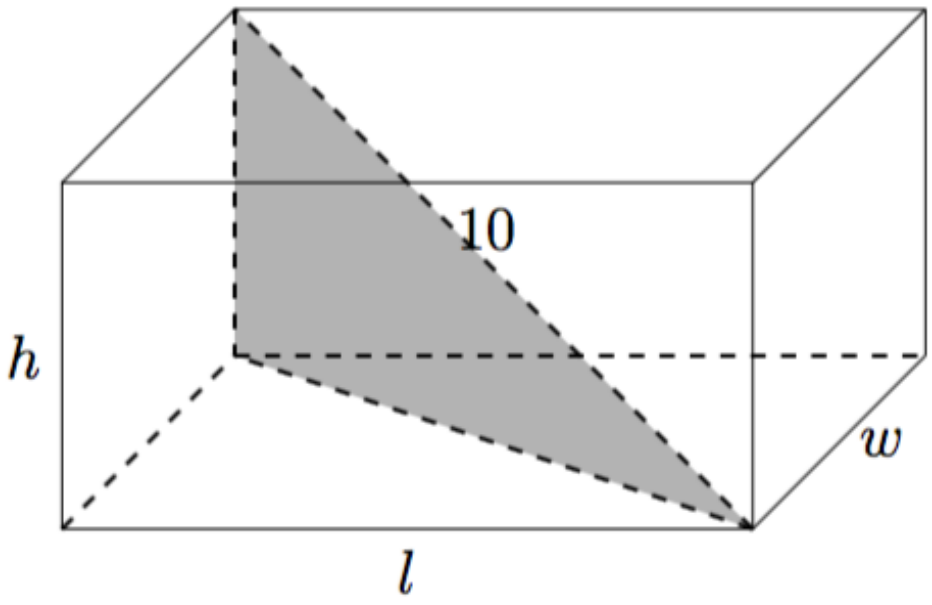
Topic: Diagonal of a right rectangular prism

Question: Which dimensions could not be correct?

In this right rectangular prism with a diagonal of 10, which set of l, w, and h could not be correct?



Answer choices:

A $l = 2\sqrt{6},\ w = 2\sqrt{10},\ h = 6$

B $l = 5\sqrt{2},\ w = 4\sqrt{2},\ h = 3\sqrt{2}$

C $l = 3\sqrt{5},\ w = 2\sqrt{6},\ h = 4\sqrt{2}$

D $l = 8,\ w = 4,\ h = 2\sqrt{5}$

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Solution: C

We'll try each of the answer choices in the formula for the diagonal of a right rectangular prism,

$$d = \sqrt{l^2 + w^2 + h^2}$$

For answer choice A:

$$d = \sqrt{\left(2\sqrt{6}\right)^2 + \left(2\sqrt{10}\right)^2 + 6^2} = \sqrt{100} = 10$$

For answer choice B:

$$d = \sqrt{\left(5\sqrt{2}\right)^2 + \left(4\sqrt{2}\right)^2 + \left(3\sqrt{2}\right)^2} = \sqrt{100} = 10$$

For answer choice C:

$$d = \sqrt{\left(3\sqrt{5}\right)^2 + \left(2\sqrt{6}\right)^2 + \left(4\sqrt{2}\right)^2} = \sqrt{101}$$

For answer choice D:

$$d = \sqrt{8^2 + 4^2 + \left(2\sqrt{5}\right)^2} = \sqrt{100} = 10$$

Answer choice C is the only answer choice that doesn't come out to 10 as the value for the diagonal.

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